IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTORNEY DOCKET NO. SJJO920010016US1

In re Application of:	§	
	§	
DAVID W. ALBRECHT ET AL.	§	Examiner: **GUILLERMO PEREZ**
	§	
Serial No.: **09/902,310**	§	
	§	
Filed: **10 JULY 2001**	§	Art Unit: **8192**
	§	
For: **FLUX LEAKAGE BARRIER IN FLUID BEARING FOR DISK DRIVE**	§	

AMENDMENT A UNDER 37 C.F.R. § 1.111

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This Amendment is submitted in response to the Office Action dated October 4, 2002, with a shortened statutory period ending January 4, 2003. Please amend the above-identified application as follows:

CERTIFICATE OF FACSIMILE TRANSMISSION
37 CFR 1.8(A)

I hereby certify that this correspondence is being Facsimile transmitted to the U. S. Patent and Trademark Office, Attention: **Examiner Guillermo Perez.**, Art Unit **2834**, at **(703) 305-3432** on this the **19th day of November, 2002**.

Betty Kirk
Printed name of person sending fax

Signature of person sending fax

IN THE CLAIMS:

Cancel claim 3 and 9-11.

Amend claims 1, 2, 7, 8, and 13.

1. A spindle, comprising:

a shaft;

a sleeve coaxial with the shaft;

a first gap formed between the sleeve and the shaft for facilitating rotation therebetween;

a hub bound to the sleeve;

a second gap located between the hub and the sleeve, the second gap being larger than the first gap; and wherein

the hub is adapted to be secured to a rotor magnet which is adjacent to a stator, such that the second gap reduces magnetic flux leakage into the sleeve and a substantially negligible amount of flux crosses the first gap into the shaft.

2. The spindle of claim 1, further comprising a pattern of shallow groove features incorporated on one of the shaft and the sleeve to facilitate hydrodynamic generation of a fluid film of high pressure and stiffness.

7. A precision spindle assembly, comprising in combination:

a stator;

a spindle hub having a rotor magnet mounted thereto that is rotatable relative to the stator; wherein the spindle hub comprises:

a ferromagnetic stationary shaft;

a rotatable ferromagnetic sleeve coaxial with the shaft;

a fluid bearing gap formed between the sleeve and the shaft for facilitating rotation therebetween;

a ferromagnetic hub bound to the sleeve;

a large gap located between the hub and the sleeve, wherein the large gap is larger than the fluid bearing gap and is in the range of 200 to 300 microns; and

a substantially non-permeable material, such as epoxy, filling the large gap in order to reduce magnetic flux leakage into the sleeve such that a substantially negligible amount of flux crosses the fluid bearing gap into the shaft.

8. The precision spindle assembly of claim 7, further comprising a pattern of shallow groove features incorporated on one of the shaft and the sleeve to facilitate hydrodynamic generation of a fluid film of high pressure and stiffness.

13. The method of claim 12 wherein step (a) comprises forming a pattern of shallow groove features on one of the shaft and the sleeve to facilitate hydrodynamic generation of a fluid film of high pressure and stiffness.

REMARKS

Applicant has amended the drawings to comply with the requirement stated by the Examiner in the present office action. Regarding the claims, claims 3 and 9-11 have been canceled and incorporated into their respective independent claims.

The present invention includes a significantly large radial gap between the rotating, ferromagnetic hub and rotating sleeve of a fluid bearing spindle. The large gap may be filled with a medium, such as air, or a non-permeable material, such as epoxy. The large gap is preferably on the order of several hundred microns. Because of the large gap, the magnetic flux leakage from the rotating journal sleeve into the stationary shaft at the center of the spindle is negligible. Consequently, iron loss in the shaft caused by magnetic flux leakage into the shaft is reduced to acceptable noise levels. Importantly, Applicant's large gap is not located between the shaft and the sleeve, which would create dimensional intolerances, nor between the rotor and the stator.

In contrast, the primary cited reference *Mita* discloses a method of increasing an air gap "between the rotor and the stator." Col.2, line 22. Applicant's invention is not concerned with the gap between the rotor and stator. Rather, the large gap of Applicant's invention is positioned between two relatively stationary components that do *not* rotate relative to each other. Thus, *Mita* fails to anticipate the present invention since its "increased gap size" is located in the wrong place (i.e., between rotating parts).

Furthermore, the motivation behind *Mita's* increased gap size would not teach one skilled in the art to widen any other gap in its apparatus. The reason *Mita* teaches a wider gap is to provide additional room for the "eccentricity of the rotor." Col.2, line 20. *Mita's* rotor is eccentric because "a fragment or broken piece of the permanent magnet is caught in the air gap, thereby causing a malfunction of the rotating machine." Col.1, lines 65-67. Thus, *Mita* provides a larger gap in case it needs to accommodate chunks of its disintegrating rotor, which rotates relative to the stationary stator. Since Applicant's invention involves widening the gap between two *stationary* components (i.e., the sleeve and the hub), one skilled in the art would not be inclined to modify a prior art spindle in the manner described by the Examiner after reading *Mita*. Consequently, *Mita* cannot be used to support the present rejection and render Applicant's invention obvious when used in combination with the prior art.

Since *Mita* is effectively disqualified, the other obviousness rejection under the reference *Suzuki* is moot. However, even if both *Mita* and *Suzuki* are combined with the prior art, Applicant's invention is still not taught or suggested by their combination. Adding *Suzuki* to *Mita* merely results in an apparatus with a shield ring located between its rotor and stator. However, adding a solid substance between the rotor and stator would be absurd since it would impede motion between these rotational parts. Moreover, such a combination would completely violate the teachings of *Mita* which clearly require more space between the rotor and the stator to make additional room for debris and the like. For these reasons, the present invention is not obvious in light of the cited combination of prior art references.

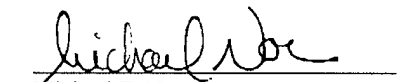
Notwithstanding these arguments, Applicant has amended the claims to better clarify the present invention. For example, claim 1 is clearly distinguishable over the art since it requires, "a hub bound to the sleeve," "a second gap located between the hub and the sleeve," and, "the second gap being larger than the first gap." Since the hub and sleeve are bound to each other there is no relative rotation. Unlike the prior art, the second gap is *not* located between the movable rotor and stator. Moreover, the second gap is larger than the first gap to reduce "magnetic flux leakage into the sleeve and a substantially negligible amount of flux crosses the first gap into the shaft." As stated above, Applicant maintains that (1) *Mita* places the gap in the wrong location, (2) for the wrong motive (i.e., make room between rotating parts), *Suzuki* cannot be combined with *Mita* since (3) the rotor could not rotate, and (4) this violates the teaching of *Mita*. For these reasons, claim 1 cannot be considered obvious in light of the cited combination, and is now in condition for allowance.

Claims 2 and 4-6 depend from claim 1 and are allowable for the same reasons as claim 1. In addition, each of these claims contains language that further distinguishes them over the prior art. For example, claim 2 now requires, "a pattern of shallow groove features incorporated on one of the shaft and the sleeve to facilitate hydrodynamic generation of a fluid film of high pressure and stiffness." This requirement is not found in or suggested by any of the references. Claim 4 adds that "the second gap is filled with a substantially non-permeable material," while claim 5 states that "the second gap is filled with epoxy." Claim 6 limits the second gap to "the range of 200 to 300 microns." None of these specific substances are mentioned for insertion in the prescribed location. Thus, each of these claims is allowable.

Independent claim 7 was narrowly rewritten to include many distinguishing features with respect to the art, including all of the limitations of its canceled dependent claims. These limitations track that of the preceding dependent claims and are likewise allowable. Claim 8 depends from claim 7 and has the language of claim 2. Claims 7 and 8 are now in condition for allowance. Finally, method claim 12 is directed to insulating a precision spindle assembly against magnetic flux. Claim 12 and its dependent claims require some of the same features as claim 1 and its progeny, and are similarly allowable.

It is respectfully submitted that the claims are in condition for allowance and favorable action is requested. No extension of time is believed to be required. However, in the event that an extension of time is required, please charge that extension fee and any other required fees to **IBM Corporation Deposit Account Number 09-0466.**

Respectfully submitted,



Michael E. Noe, Jr.
Reg. No. 44,975
BRACEWELL & PATTERSON, L.L.P.
P.O. Box 969
Austin, Texas 78767-0969
(512) 343-6116

ATTORNEY FOR APPLICANTS